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the first named place, and serve to correlate the formation with Conrad's Astoria Miocene. The fauna of the Sooke beds is quite different from any of the Oregon or Californian Miocene or Pliocene faunas known to the writer. His conclusion, however, from evidence in hand, is that the Sooke beds are of middle Neocene age, and that the time of their deposition was considerably later than that of the Carmanah Point beds. (Univ. Calif. Bull., Dept. Geol., Vol. 2, 1896.)

A recent Bulletin of the *Soc. Belge de Geol.* contains a figure of the femur of the anthropomorphous monkey found by Kaup in the Pliocene beds (Rhenan) at Eppelsheim (Haut-Rhin). At first it was decided not to separate this form generically from the Dryopithecus of Saint-Gauden's, but a recent critical comparison made by Pholig demonstrates that such a distinction should be made. He therefore proposes the name *Paidopithex rhenanus* for the Eppelsheim species. A comparison of the Rhenan femur with those of modern allied forms shows it to be more anthropomorphous, both in general and in many details, than are those of the Gorilla or the Chimpanzee. (Bull. Soc. Belge de Geol., 7, IX (1895), 1897.)

BOTANY.[1]

The Death of Sachs.—The death of Dr. Julius von Sachs, in Würzburg, on May 28th, is announced. He was born in Breslau in 1832, and was therefore sixty-five years of age at the time of his death. He was educated in the University of Prague, and in 1859 became assistant in physiological botany in the Royal Experiment Station at Tharandt, Saxony. In 1861 he became professor of botany in Bonn; in 1867 in Freiburg, and in 1868 in Würzburg. His most noted works are *Handbuch der Experimental-Physiologie der Pflanzen* (1865); *Lehrbuch der Botanik* (1st edition, 1868; 2d, 1870; 3d, 1873; 4th, 1874). *Geschichte der Botanik* (1875), *Vorlesungen über Pflanzen-Physiologie* (1882), and *Abhundlungen über Pflanzen-Physiologie* (1892). Of these the third and fourth editions of the *Lehrbuch*, *Geschichte* and *Vorlesungen über Pflanzen-Physiologie* were translated into English, and have been for years familiar to all classes of botanists in this country. The appearance of Bennett and Dyer's translation to the third edition of the *Lehrbuch* in 1875 marked an epoch in botany in America. The

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[1] Edited by Prof. C. E. Bessey, University of Nebraska, Lincoln, Nebraska.

German edition had been read just enough to prepare botanists for the English volume, which was received with the greatest favor. It at once became the great reference book in many a college department of botany, and this place it has maintained in many cases to the present time, although it is now nearly a quarter of a century since the author wrote the German edition. In 1882, Dr. Vines brought out an English version of the fourth edition, with additions and explanations of his own, thus bringing the work forward practically to the date of its issue. This, like its predecessor, has been extensively used as a work of reference. In 1887, Marshall Ward brought out the "Lectures on the Physiology of Plants," and in 1890, Garnsey and Balfour the "History of Botany."

The unusual clearness with which he was able to express his ideas contributed greatly to the popularity of Sachs's writings, and this, added to his power of discriminating between the less and the more important factors in the problems which presented themselves, made him one of the most helpful of modern botanists.—CHARLES E. BESSEY.

Opportunities for Research in the Missouri Botanical Garden.—A recent circular by the director calls attention to the Garden as affording opportunities for certain lines of research in botany. He says, "For this purpose additions are being made constantly to the number of species cultivated in the grounds and plant houses, and to the library and herbarium, and, as rapidly as it can be utilized, it is proposed to secure apparatus for work in vegetable physiology, etc., the policy being to secure a good general equipment in all lines of pure and applied botany, and to make this equipment as complete as posible for any special subject on which original work is undertaken by competent students.

"A very large number of species, both native and exotic, and of horticulturists' varieties, are cultivated in the Garden and Arboretum and the adjoining park, and the native flora easily accessible from St. Louis is large and varied. The herbarium, which includes over 250,000 specimens, is fairly representative of the vegetable life of Europe and the United States, and also contains a great many specimens from less accessible regions. It is especially rich in material illustrative of Cuscuta, Quercus, Coniferae, Vitis, Juncus, Agave, Yucca, Sagittaria, Epilobium, Rumex, Rhamnaceae, and other groups monographed by the late Dr. Engelmann or by attachés of the Garden. The library, containing about 12,000 volumes and 13,000 pamphlets, includes most of the standard periodicals and proceedings of learned bodies, a good collection of morphological and physiological works, nearly 500 carefully selected botanical volumes published before the period of Linnæus, an unusually large number of monographs of groups of cryptogams and flowering plants, and the entire manuscript notes and sketches representing the painstaking work of Engelmann. A complete author's catalogue of the library, shelf-marked to indicate the principal subject contents of the several works, is now in process of preparation, and will shortly be published.

"These facilities are freely placed at the disposal of professors of botany and other persons competent to carry on research work of value in botany or horticulture, subject only to such simple restrictions as are necessary to protect the property of the Garden from injury or loss."

It has been the hope of the editor of this department of the NATURALIST that the Missouri Botanical Garden should become a great inland laboratory for research in systematic, morphological and physiological botany, to which duly accredited students might be sent from the universities of the Mississippi Valley. There are many problems for whose solution botanists need tropical and sub-tropical laboratories, but there are many more for which just such facilities as are being provided by Dr. Trelease are far more useful; while the much milder climate of St. Louis, to say nothing of the difference in travelling and living expenses, still more fully justify the effort to establish this research laboratory. The returns for a certain outlay will be much greater than in some distant laboratory, and it will be far more profitable for universities to endow tables here than in less accessible places.

—CHARLES E. BESSEY.

Botanical Notelets.—Mr. C. G. Lloyd has issued his Second Report on the Lloyd Mycological Museum (Cincinnati, Ohio), from which we learn that on the first day of January, 1897, it contained 1431 specimens, representing 760 species. From it we learn also that the botanical library of the Museum contains 4387 bound volumes and about 2000 pamphlets. In this connection we may mention again the series of beautiful photogravures of American Fungi issued by Mr. Lloyd, in which the species are represented with wonderful fidelity.

Dr. C. Hart Merriam has recently described (Proc. Biol. Socy., Washington, **10**: 115) a new species of fir tree from the San Francisco and Kendrick Mts. of Arizona. It has hitherto been confused with *Abies lasiocarpa* (Hook.) Nutt., (*Abies subalpina* Engelm.) from which it differs in its corky bark, longer leaves, smaller cones and broader scales. He names it *A. arizonica.*

Mr. T. C. Palmer describes (Proc. Acad. Nat. Sci., Philadelphia, March, 1897), a method of demonstrating the absorption of carbon dioxide, and the generation of oxygen, by diatoms, by the use of inverted test-tubes filled with water tinged with hæmatoxylin. On the addition of carbon dioxide the rosy tint turns yellow, and, as the diatoms absorb the acid, the rosy tint reappears.

The third of the "Teachers' Leaflets on Nature Study," issued by Professor Bailey, is entitled "Four Apple Twigs." Like its predecessors, it is certain to be very helpful to both teachers and students.

Professor M. A. Brannon's paper on the "Structure and Development of *Grinnellia americana*," in the March number of the *Annals of Botany*, brings out a number of interesting facts about this beautiful American red seaweed. He found this species to be particularly well adapted to the study of the various phenomena of reproduction. The plant, when cut into small pieces, reproduces vegetatively by proliferation. Carpospores and tetraspores germinate readily under favorable conditions which are easily controlled. The antherozoids (which are non-motile) are formed by abstriction. The trichogynes are often branched, sometimes as many as five growing from a cystocary. The pericarp is only two or three layers thick.

Mr. F. V. Coville publishes some interesting notes on the plants used by the Klamath Indians of Oregon (Contrib. U. S. Natl. Herb., V, No. 2) as one of the results of a botanical survey of the plains of southeastern Oregon in 1896. The plants considered range from lichens (*Alectoria fremontii* and *Evernia vulpina*) to grasses, lilies, knotweeds, roseworts, umbelworts, and composites. These plants are used for food, dyes, clothing, bows, arrows, baskets, buckets, medicines, etc.

Bulletin 9 of the Minnesota Botanical Studies maintains the high standard of this unique state publication. It contains papers on the Lichens of Minneapolis (*Fink*), the North American Hyphomyceteæ (*Pound* and *Clements*), Mosses at High Altitudes (*Holzinger*), Dorsiventral Leaves (*Day*), the Genus Coscinodon in Minnesota (*Holzinger*), the Ferns and Flowering Plants of the Hawaiian Islands (*Heller*), Symbiosis (*Schneider*), the Distribution of Woody Plants at Lake of the Woods (*MacMillan*), the Alkaloids of Veratrum (*Frankforter*).

H. J. Webber's paper on the Water Hyacinth (*Piaropus crassipes* (Mart.) Britton) in Bulletin 18, of the Division of Botany of the U. S. Department of Agriculture, describes the rapid spread in Florida rivers of a very pretty plant hitherto used for ornamental purposes, until it has now become an intolerable nuisance. It often seriously impedes, and, in fact, sometimes actually stops the progress of steamboats. The problem of its eradication is a very difficult one.

The Asa Gray Bulletin for June appears in an enlarged and improved form. The editors say in regard to it: "For some time it has been felt that there is room in the United States for a botanical magazine of a more popular nature than any which now occupy the field," and they hope to make the little magazine fill this place. G. H. Hicks of Kensington, Md., the Editor-in-Chief, is to be aided by a number of well known botonists. It should be widely circulated in the public schools.

M. C. Fernald's "Second Supplement to the Catalogue of Maine Plants" appears in the *Proceedings of the Portland Society of Natural History* (Vol. II, Part 4). It contains 101 species and varieties, several of which are described as new to science. Among the interesting additions are *Prunus cuneata* Raf., *Lythrum alatum* Pursh, *Coreopsis tinctoria* Nutt., *Fraxinus viridis* Michx. f., *Solanum rostratum* Dunal, and *Sassafras officinalis* Nees.

A new book on fossil plants is now appearing in parts from the publishing house of Ferd. Dummlers, Berlin. It is the work of Dr. H. Potonié, and bears the title of *Lehrbuch der Pflanzenpaleontologie.* The first *lieferung* contains 112 pages, and includes chapters on "fossil plants in general," "doubtful fossil plants," and a "systematic discussion of fossil remains." It is freely illustrated.

Professor F. Lamson-Scribner, the agrostologist of the Department of Agriculture, in Washington, D. C., has made a valuable contribution to our knowledge of the grasses of the United States by bringing out an illustrated bulletin (No. 7) under the title of "American Grasses," consisting of excellent figures of three hundred and two species. Accompanying each is a brief description. It is to be hoped that larger editions of these useful publications may be made in the future, so that they may receive wider distribution.—CHARLES E. BESSEY.

VEGETABLE PHYSIOLOGY.

Chemotropism of Fungi.—Manabu Miyoshi, a student of Pfeffer in Leipsic, has considerably extended our knowledge of the behavior of fungi toward particular substances, and has opened up a wide field for speculation and experiment relative to the causes of parasitism. He experimented at first with six common fungi, all usually designated as Saprophytes, viz.: *Mucor mucedo, M. stolonifer, Phycomyces nitens, Penicillium glaucum, Aspergillus niger* and *Sapro-*